

What is Claimed is:

1. Apparatus for measuring instability of a motion segment unit of a spine comprising:
 - 5 a) motor means for applying a controllable force to a distractor arm assembly;
 - b) a distractor arm assembly operatively engaged to the motor means comprising:
 1. a collar assembly fixedly secured to the motor means,
 - 10 2. screw means operatively engaged to the motor means through said collar assembly and rotatable when the motor means is operational,
 3. a pair of arms each having at least two arm segments pivotal with respect to each other, a first of said arm segments being attached to the collar assembly and a second arm segment having a remote end for engaging a portion of the motion segment unit of the spine, and
 - 15 4. a pivot collar assembly for engaging the second arm segments enabling the second arm segments to be movable with respect to each other.

20 wherein rotation of the screw means causes the pivot collar assembly to move along the screw means causing the first and second arm segments to move relative to each other whereby the remote ends of the arms move away from each other to

provide a controllable force on adjacent portions of a motion segment unit and toward each other to release the controllable force against said adjacent portions.

2. The apparatus of claim 1 wherein the controllable force is a constant
5 rate of force.

3. The apparatus of claim 1 further comprising motion segment unit contacting devices secured to the remote ends of the arms, said motion segment unit engaging devices engaging the respective portions of the motion segment units.

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4. The apparatus of claim 3 wherein the motion segment unit contacting devices are selected from the group consisting of pins, pedicle screws and bone drill bits and combinations thereof.

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5. The apparatus of claim 1 further comprising means for measuring resistance to the force applied by the motor means to the distractor arm assembly.

6. The apparatus of claim 5 wherein the means for measuring resistance is a load cell or strain gauge.

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7. The apparatus of claim 1 wherein the motor means is a stepper motor assembly.

8. The apparatus of claim 1 wherein the screw means is a jackscrew.

9. The apparatus of claim 1 further comprising means for releasing the distractor arm assembly from the motor means.

5 10. The apparatus of claim 1 comprising means for rotatably connecting one of said arm segments to the collar assembly.

11. The apparatus of claim 3 wherein the motion segment unit contacting devices are inserted into the motion segment unit, said remote end of the second 10 arm segment comprising means for reversible locking the second arm segment to the motion segment unit contacting devices.

12. The apparatus of claim 1 wherein the controllable force is sufficient to provide a constant rate of distraction on the motion segment unit.

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13. The apparatus of claim 1 wherein the controllable force is a constant rate of force.

14. The apparatus of claim 1 further comprising:
20 a) detection means connected to said distractor arm assembly for measuring the resistance of the pair of arms to said distraction which is related to the resistance of the adjacent vertebrae of the motion segment unit to said distraction, at a plurality of force-exerting

positions, said detection means generating an output signal corresponding to said resistance; and

b) translation means adapted to receive said output signal from said detection means and for translating said output signal into interpretable data.

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15. The apparatus of claim 1 wherein the remote ends of the second arm segments comprise a dual leg assembly comprising a pair of legs having a forward end attached to the second arm segments and a remote end comprising a motion 10 segment unit engaging assembly.

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16. The apparatus of claim 15 wherein the motion segment unit engaging assembly includes a motion segment unit contacting device.

17. The apparatus of claim 16 wherein the motion segment unit contacting

devices is a pin, pedicle screw and bone drill or combination thereof.

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18. A method of measuring instability of a motion segment unit of the spine comprising applying a controllable force to a distractor arm assembly operatively engaged to the motion segment unit, said distractor arm assembly comprising:

1. a collar assembly fixedly secured to the motor means,
2. screw means operatively engaged to the motor means through said collar assembly and rotatable when the motor means is operational,

3. a pair of arms each having at least two arm segments pivotal with respect to each other, a first of said arm segments being attached to the collar assembly and a second arm segment having a remote end for engaging a portion of the motion segment unit of the spine, and
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4. a pivot collar assembly for engaging the second arm segments enabling the second arm segments to be movable with respect to each other.

10 19. The method of claim 18 comprising rotating the screw means causing the pivot collar assembly to move along the screw means causing the first and second arm segments to move relative to each other to provide the controllable force on adjacent portions of the motion segment unit and toward each other to release the controllable force against said adjacent portions, said controllable force 15 generating data corresponding to a characteristic of the motion segment unit.

20. The method of claim 19 wherein the characteristic of the motion segment unit is stiffness.